ETH zürich

Institute of Fluid Dynamics
Institute of Energy and Process Engineering

Colloquium Thermo- and Fluid Dynamics

Revisiting airflow and aerosol transport phenomena in the deep lungs

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Mapping respiratory airflows and the transport mechanisms of inhaled aerosols characteristic of the deep regions of the lungs are of broad interest in assessing both pulmonary health risks and inhalation therapy outcomes. In the present talk, I will discuss our current understanding of such phenomena that take place within the complex anatomical environment of the deep lungs, characterized by submillimeter 3D alveolated airspaces and nominally slow resident airflows, also known as low-Reynolds-number flows. I will exemplify advances brought forward by experimental efforts, in conjunction with numerical simulations, to revisit past mechanistic theories of respiratory airflow and particle transport in the distal lung regions. Most significantly, I will highlight how microfluidics spanning the past decade have accelerated opportunities to deliver anatomically inspired in vitro solutions that capture with sufficient realism and accuracy the leading mechanisms governing both respiratory airflow and aerosol transport at true scale. Such efforts have provided previously unattainable in vitro quantifications on the local transport properties in the deep pulmonary acinar airways, with new paths to resolve mechanistic interactions between airborne particulate carriers and respiratory airflows at the pulmonary microscales.

Date: Wednesday, 13 April 2022
Time: 16:15 - 17:15h
Place: ETH Zurich, ML H 44
Host: Prof. Filippo Coletti, IFD

Further information: https://ifd.ethz.ch/events/ktf.html

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